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IMPORTANCE OF LIFE CYCLE COST ANALYSIS IN CONSTRUCTION INDUSTRY-REVIEW

Nikhil Dilip Jadhav
Student, *Civil Engineering, A.I.S.S.M.S's College of Engineering, Pune, India*
nikhiljadhav010@gmail.com

Abstract: **Life cycle cost analysis is a tool used to evaluate the total cost of a system over its entire life span. Life cycle cost analysis (LCCA) as applied to civil engineering, sometimes also referred to as value engineering or life cycle costing, involves accounting for all costs related to construction, operation, maintenance, and disposal at the end of the useful life of a structure. In short, it provides a detailed account of the total costs of a project over its entire life span. LCCA has been proven to create short-term and long-term savings in construction projects by helping decision-makers identify the most beneficial and cost effective projects and alternatives. This review aims at creating a basic understanding of this topic for the reader by discussing parameters presented in recent research papers.**

Keywords *– LCCA-Life cycle cost analysis, maintenance costs, cost effective.*

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I INTRODUCTION

LCCA is a cost evaluation tool which is often used at the initial phase planning in construction, and which examines all the costs associated with the project. While designing a project, a number of options are first proposed. These options may have different initial costs, maintenance costs, etc. Considering a particular alternative, LCCA helps in determining the total cost of the project for a particular life span. It includes economical examination of various alternatives that considers all of the significant costs of ownership over the useful life. Finally, the project alternative with the best economic feasibility is selected. The various costs considered in LCCA include:

- Initial costs
- Financing costs
- Maintenance and repair costs

For getting the best outcome for a LCCA, an in-depth understanding of the theoretical engineering and economics is required because input parameters in LCCA are intrinsically tentative (E.g. Analysis period, type and timings of activities, etc.). And as the accuracy of prediction of costs is very important in LCCA, any error in estimation of these costs can drastically change the final outcome. Hence, the LCCA cannot be necessarily considered to be a full proof prediction of the future. In spite of these limitations, LCCA can provide the decision-makers useful information based on which they can use limited funds in the most cost-effective way.

The basic steps involved in LCCA are:

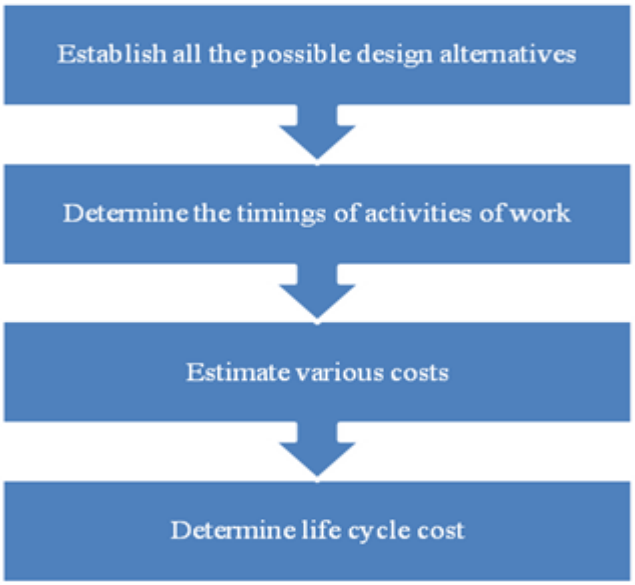

Figure 1: LCCA

II OBJECTIVE

The purpose of this paper is to demonstrate the concept of Life Cycle Cost Analysis, its importance, uses and advantages to the construction agencies if it is implemented successfully in decision making.

III TERMINOLOGY USED IN LIFE CYCLE COST ANALYSIS

During the analysis, the following terms are widely used:

- **NPV** (**N**et **P**resent **V**alue) -Considers time value of money and represents the present value of the project.
- **Future Value (FV) -** Shows the value of money/project at a given time in the future.
- **Analysis Period or study period** - The period of time over which LCCA is performed.
- **Discount rate**- Refers to the rate of change of true value of money over time, considering various other factors.
- **Monetary Agency Costs**- Costs associated with the alternative that are incurred by the agency during the analysis period. Includes initial construction cost, annual maintenance cost, demolition and removal cost, etc.
- **User costs-** Costs associated with the alternative that is incurred by the users of a roadway over the analysis period. Includes vehicle operating costs, delay costs, crash costs, etc.
- **Salvage value** -The value of the project after the end of the analysis period

IV LITERATURE REVIEW

Implementing LCCA while selecting a construction work or project alternative or when determining the most efficient way to maintain a project can be helpful in making cost effective investment decisions, managing risks, and ensuring long-term affordability for the general public.

As per BS/ ISO 15686-5 Buildings & Constructed Assets: Service Life-life cycle costing is the cost of an asset, or its part throughout its cycle life, while fulfilling the performance requirements. Renata Schneiderova Heralova r highlights the role of life cycle cost analysis in deciding on the proposals of construction work. Waldo Galle cites life cycle costing as an early stage feasibility analysis. Sofia Lingegard discusses maintenance strategies for large technical systems with long life cycles.

V SUMMARY

Life cycle cost analysis, if implemented, is highly beneficial to the owner. It has a wide range of applications such as calculating the most cost-effective alternative for a project, evaluating the design requirements and comparing overall costs of various types of projects. There are examples of organizations, by using LCCA, have saved millions of dollars by not investing in a project that was not cost effective. Despite the fact that LCCA has a number of advantages, its use is limited (mostly used only by the private agencies) and this method is not widely adopted. But nowadays, there is an increased awareness regarding LCCA and it is not too long before every other agency recognizes its importance and implements it in evaluating projects.

VI CONCLUSION

While estimating the cost of a project, it is often seen that the costs for maintenance, repairs, reworks, etc. are ignored while considering only the initial design and construction cost. Such decision-making results in selection of a design alternative which results in losses in the future or an alternative that proves to be unfeasible in the future. Scrutinizing all the life cycle costs can help an organization in making the right investment today which will save a considerable amount of money in the long-term. And in today's world where organizations are becoming more and more conscious about funding and economical feasibilities, LCCA has become an even more important tool.

REFERENCES

[1] Renata Schneiderova Heralova ,"Life cycle cost optimization within decision making on alternative designs of public buildings." in Procedia Engineering 85(2014) 454-463

[2] Waldo galle, Mieke Vandenbroucke and Niels De Temmerman ,"Life cycle costing as an early stage feasibility Analysis: The adaptable transformation of Willy Van Der Meeren's student residences" in Procedia economics and Finance 21(2015) 14-22

[3] Sofia Lingegard, Mattias Lindahl and Andreas Syberg, "Life-cycle cost strategies for harbors- a case study" in Procedia CIRP 30(2015) 317-322

[4] Mr.Akhai Mudassar Mohammad Shafi, Mr.Ahmed Afaque Shakeel and Siddesh Kashinath Pai "Life cycle cost analysis of road pavements in rural areas." in Internation Journal of Science technology and Management Vol. no.5, Issue no.8, August 2016:

[5] Report by the Eno centre of transportation and American Society Of Civil Engineers: "Maximizing the value of Investments using Life Cycle Cost Analysis"